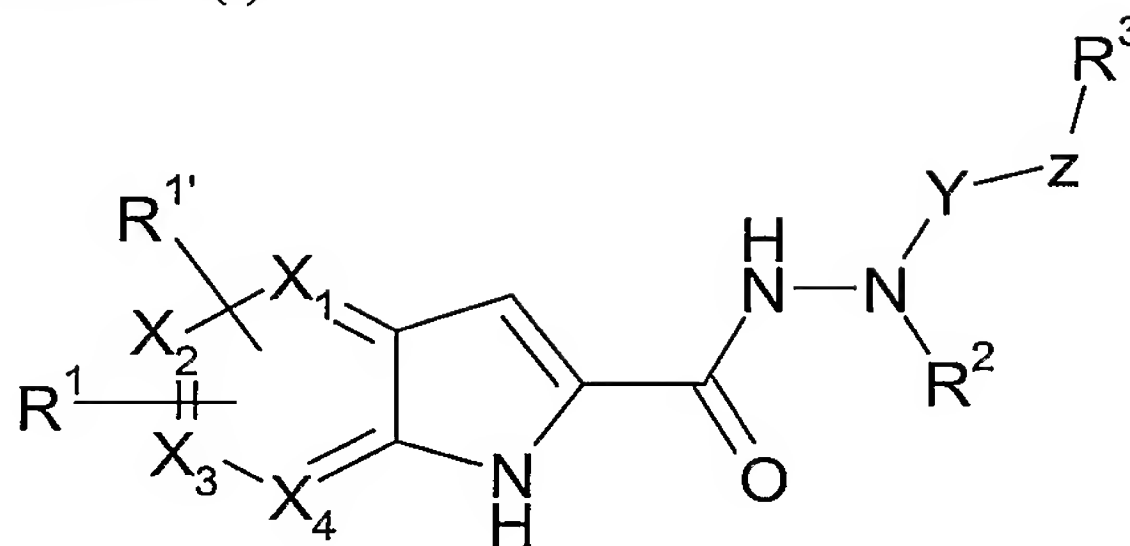


CLAIMS:

1. A compound of formula (I):



I

or a pharmaceutically acceptable salt thereof, wherein:

one of X_1 , X_2 , X_3 and X_4 is N and the others are C;

Y is $-C(O)-$, $-S(O)_2-$, or $-C(NH)-$;

Z is C_{1-4} alkylene, oxygen, $-(CH_2)_mO-$, $-O(CH_2)_m-$, $-NR-$, $-(CH_2)_mNR-$, $-NR(CH_2)_m-$, $-(CH_2)_mS(O)_2-$, or a bond;

m is 1, 2, 3, or 4;

R is C_{0-4} alkyl, C_{0-4} alkylaryl, or C_{0-4} alkylhetaryl;

R^1 and $R^{1'}$ are each independently, halogen, hydroxy, cyano, C_{0-4} alkyl, C_{1-4} alkoxy, fluoromethyl, difluoromethyl, trifluoromethyl, ethenyl, or ethynyl;

R^2 is C_{0-4} alkyl, $COOR^6$, COR^6 , C_{1-4} alkoxy C_{1-4} alkyl-, hydroxy C_{1-4} alkyl-, cycloalkyl C_{0-4} alkyl-, aryl C_{0-4} alkyl-, or hetaryl C_{0-4} alkyl-, wherein any of the aryl or hetaryl rings are optionally substituted with 1-2 independent halogen, cyano, C_{1-4} alkyl, C_{1-4} alkoxy, $-N(C_{0-4}alkyl)(C_{0-4}alkyl)$, $-SO_2C_{1-4}alkyl$, $-SO_2N(C_{0-4}alkyl)(C_{0-4}alkyl)$, hydroxy, fluoromethyl, difluoromethyl, or trifluoromethyl substituents;

R^3 is hydrogen, $-COOC_{0-4}alkyl$, $C_{1-4}alkoxy$, $C_{1-4}alkyl$, aryl $C_{1-4}alkylthio-$, $-C_{0-4}alkylaryl$, $-C_{0-4}alkylhetaryl$, $-C_{0-4}alkylcycloalkyl$, or $-C_{0-4}alkylheterocyclyl$, wherein any of the rings is optionally substituted with 1-3 independent halogen, cyano, $C_{1-4}alkyl$, fluoromethyl, difluoromethyl, trifluoromethyl, $-C_{0-4}alkylNHC(O)O(C_{1-4}alkyl)$, $-C_{0-4}alkylNR^7R^8$, $-C(O)R^9$, $C_{1-4}alkoxyC_{0-4}alkyl-$, $-COOC_{0-4}alkyl$, $-C_{0-4}alkylNHC(O)R^9$, $-C_{0-4}alkylC(O)N(R^{10})_2$, $-C_{1-4}alkoxyC_{1-4}alkoxy$, hydroxy $C_{0-4}alkyl-$, $-NHSO_2R^{10}$, $-SO_2(C_{1-4}alkyl)$, $-SO_2NR^{11}R^{12}$, 5- to 6-membered heterocyclyl, phenyl $C_{0-2}alkoxy$, or phenyl $C_{0-2}alkyl$ substituents, wherein phenyl is optionally substituted with 1-2 independent halogen, cyano, $C_{1-4}alkyl$, $C_{1-4}alkoxy$, $-N(C_{0-4}alkyl)(C_{0-4}alkyl)$, $-SO_2C_{1-4}alkyl$, $-SO_2N(C_{0-4}alkyl)(C_{0-4}alkyl)$, hydroxy, fluoromethyl, difluoromethyl, or trifluoromethyl substituents, or two bonds on a ring carbon of the heterocyclyl group optionally can form an oxo ($=O$) substituent;

or R^3 is $-NR^4(-C_{0-4}alkylR^5)$;

R^4 is $C_{0-3}alkyl$, $-C_{2-3}alkyl-NR^7R^8$, $C_{3-6}cycloalkyl$ optionally substituted by hydroxy $C_{0-4}alkyl-$ further optionally substituted by hydroxy, $C_{1-2}alkoxyC_{2-4}alkyl-$, or $C_{1-2}alkyl-S(O)_n-C_{2-3}alkyl-$;

n is 0, 1, or 2;

R^5 is hydrogen, hydroxy $C_{2-3}alkyl-$, $C_{1-2}alkoxyC_{0-4}alkyl-$, or aryl, hetaryl, or heterocyclyl;

wherein a heterocyclic nitrogen-containing R⁵ ring optionally is mono-substituted on the ring nitrogen with C₁₋₄alkyl, benzyl, benzoyl, C₁₋₄alkyl-C(O)-, -SO₂C₁₋₄alkyl, -SO₂N(C₀₋₄alkyl)(C₀₋₄alkyl), C₁₋₄alkoxycarbonyl, or aryl(C₁₋₄alkoxy)carbonyl; and wherein the R⁵ rings are optionally mono-substituted on a ring carbon with halogen, cyano, C₁₋₄alkyl-C(O)-, C₁₋₄alkyl-SO₂-, C₁₋₄alkyl, C₁₋₄alkoxy, hydroxy, -N(C₀₋₄alkyl)(C₀₋₄alkyl), hydroxyC₀₋₄alkyl-, or C₀₋₄alkylcarbamoyl-, provided that no quaternised nitrogen is included; or two bonds on a ring carbon of the heterocyclyl group optionally can form an oxo (=O) substituent;

R⁶ is C₁₋₄alkyl, aryl, or hetaryl;

R⁷ and R⁸ are independently C₀₋₄alkyl, C₃₋₆cycloalkyl, or CO(C₁₋₄alkyl);

R⁹ is C₁₋₄alkyl, or C₃₋₆cycloalkyl;

R¹⁰ is C₀₋₄alkyl, or C₃₋₆cycloalkyl; and

R¹¹ and R¹² are independently C₀₋₄alkyl or together with the nitrogen to which they are attached may form a 4- to 6-membered heterocycle;

provided there are no nitrogen-oxygen, nitrogen-nitrogen, oxygen-oxygen or nitrogen-halogen bonds in the grouping -Y-Z-R³.

2. A compound according to claim 1, or a pharmaceutically acceptable salt thereof, wherein X₃ is N.

3. A compound according to claim 1, or a pharmaceutically acceptable salt thereof, wherein X₁ is N.

4. A compound according to any one of the preceding claims, or a pharmaceutically acceptable salt thereof, wherein Y is -C(O)- or -S(O)₂-.

5. A compound according to any one of the preceding claims, or a pharmaceutically acceptable salt thereof, wherein Z is C₁₋₄alkylene, oxygen, -(CH₂)_mO-, -NR- or a bond.

6. A compound according to any one of the preceding claims 1, or a pharmaceutically acceptable salt thereof, wherein R¹ and R^{1'} are each independently, hydrogen or halogen.

7. A compound according to claim 6, or a pharmaceutically acceptable salt thereof, wherein one of R¹ and R^{1'} is hydrogen and the other is 5-chloro.

8. A compound according to any one of the preceding claims, or a pharmaceutically acceptable salt thereof, wherein R² is hydrogen.

9. A compound according to any one of the preceding claims, or a pharmaceutically acceptable salt thereof, wherein R³ is hydrogen, -NR⁴R⁵, -NR⁴(-C₁₋₄alkylR⁵), aryl, hetaryl, or heterocyclyl wherein any of the rings is optionally substituted as defined in claim 1.

10. A compound of formula (I) as defined in any one of Examples 1 to 25, or a pharmaceutically acceptable salt thereof.

11. A pharmaceutical composition comprising a compound according to any one of claims 1 to 10, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier.

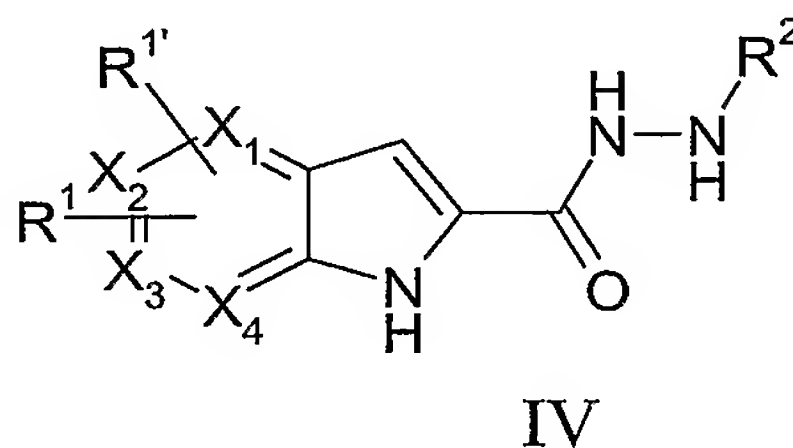
12. A method for the treatment of a disease or condition in which glycogen phosphorylase plays a role comprising a step of administering to a subject in need thereof an effective amount of a compound according to any one of claims 1 to 10, or a pharmaceutically acceptable salt thereof.

13. A method for the treatment of hyperglycemia or diabetes comprising a step of administering to a subject in need thereof an effective amount of a compound according to any one of claims 1 to 10, or a pharmaceutically acceptable salt thereof.

14. A method for the prevention of diabetes in a human demonstrating pre-diabetic hyperglycemia or impaired glucose tolerance comprising a step of administering to a subject in need thereof an effective prophylactic amount of a compound according to any one of claims 1 to 10, or a pharmaceutically acceptable salt thereof.

15. A method for the treatment of hypercholesterolemia, hyperinsulinemia, hyperlipidemia, hypertension, atherosclerosis or tissue ischemia, or achieving cardioprotection or inhibition of abnormal cell growth, comprising a step of administering to a subject in need thereof an effective amount of a compound according to any one of claims 1 to 10, or a pharmaceutically acceptable salt thereof.

16. A compound of formula (IV):



wherein R¹, R¹', R², X₁, X₂, X₃ and X₄ are as defined in claim 1, or a protected derivative thereof.